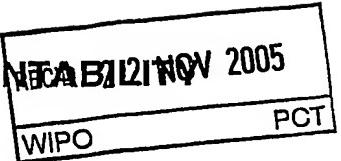


**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY REPORT ON PATENTS**  
(Chapter II of the Patent Cooperation Treaty)  
(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 4535PTWO/AG/la	<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416
International application No. PCT/EP2004/052380	International filing date ( <i>day/month/year</i> ) 30.09.2004	Priority date ( <i>day/month/year</i> ) 30.09.2003	
International Patent Classification (IPC) or national classification and IPC F16C13/02, C23C2/00, F16C23/04, F16C33/10, F16C33/66, F16C33/58			
<p><b>Applicant</b>  DANIELI &amp; C. OFFICINE MECCANICHE S.P.A. et al.</p>			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of 1 sheets, as follows:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</li> <li><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</li> </ul> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the opinion</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul>			
Date of submission of the demand  25.07.2005	Date of completion of this report  23.11.2005		
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Béguin-Adriaenssens, Telephone No. +31 70 340-3056		



## **INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.  
PCT/EP2004/052380

### **Box No. I Basis of the report**

- With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
    - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
      - international search (under Rules 12.3 and 23.1(b))
      - publication of the international application (under Rule 12.4)
      - international preliminary examination (under Rules 55.2 and/or 55.3)
  - With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

**Description, Pages**

1-8 as originally filed

## **Claims, Numbers**

1-4 received on 12.08.2005 with letter of 09.08.2005

## **Drawings, Sheets**

1/8-8/8 as originally filed

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3.  The amendments have resulted in the cancellation of:  
 the description, pages  
 the claims, Nos.  
 the drawings, sheets/figs  
 the sequence listing (*specify*):  
 any table(s) related to sequence listing (*specify*):

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).  
 the description, pages  
 the claims, Nos.  
 the drawings, sheets/figs  
 the sequence listing (*specify*):  
 any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/052380

---

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

**1. Statement**

Novelty (N)	Yes:	Claims	1-4
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-4
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-4
	No:	Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.  
**PCT/EP2004/052380**

**Re Item V**

**Reasoned Statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such Statement.**

**1 Reference is made to the following documents**

- D1: US-A-5 549 393 (MORANDO JORGE A) 27 August 1996 (1996-08-27)
- D2: US-A-3 796 471 (HOLM W) 12 March 1974 (1974-03-12)
- D3: PATENT ABSTRACTS OF JAPAN vol. 1999, no. 03, 31 March 1999 (1999-03-31) -& JP 10 317119 A (SUZUKI TEKKOSHOKKAI), 2 December 1998 (1998-12-02)
- D4: US-A-6 065 876 (YASHIRO TOSHINORI ET AL) 23 May 2000 (2000-05-23)
- D5: US-A-5 099 780 (NAPPIER ROBERT W ET AL) 31 March 1992 (1992-03-31)
- D6: US-A-5 072 689 (OOKOUCHI TAKAHIKO ET AL) 17 December 1991 (1991-12-17)
- D7: DE 42 07 034 A (EICH JOSEPH KG & PARTNER GMBH) 16 September 1993 (1993-09-16)
- D8: US 2003/111779 A1 (MORANDO JORGE A) 19 June 2003 (2003-06-19)

**2 NOVELTY OF INDEPENDENT CLAIM 1.**

- 2.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):  
A support bearing for a roll (10), adapted to be immersed in a liquid metal bath, defining a first rotation axis (66), comprising
  - a first bush (34) fitted coaxially on pins (14) at the end of a roll (10) and with substantially cylindrical outer surface,
  - a second bush (54) fixed to a supporting element (30) of the roll (10) wherein the first bush (34) is held inside the second bush (54) rotatably around the axis (66),wherein the second bush (54) has an outer convex (56) surface defining a

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/EP2004/052380

toroidal surface wherein the first and second bush (34, 54) define, during operation, a reciprocal contact surface throughout their common length, the second bush (54) is positioned inside a retaining ring (42,44,48) of the supporting element (30), said retaining ring having a substantially cylindrical inner surface whereby the bearing is suitable to rotate, substantially without friction, around a second axis orthogonal to the first axis (66).

- 2.2 The subject-matter of claim 1 of the application differs from this known support bearing in that (references applying to the application document) :
- the first bush (31) has at least one axial helical groove (39) on the outer surface, and the second bush (34) has one or more substantially axial longitudinal grooves (40,41) on the inner surface.

As no document from the cited prior art discloses such a support bearing, the subject-matter of claim 1 is therefore new (Article 33(2) PCT).

**3. INVENTIVE STEP OF INDEPENDENT CLAIM 1**

- 3.1 The problem to be solved by the present invention may be regarded as: improving lubrication by evacuating the dross formed in the melt introduced in the bearing by the turbulence of the liquid metal.
- 3.2 The solution to this problem proposed in claim 1 is: both sort of grooves, the helical groove (39) on the outer surface of the first bush and the longitudinal grooves (40,41) on the inner surface of the second bush, by facing each other contribute to a better lubrication of the bearing.
- 3.3 These features result from a step being non-obvious in view of the cited prior art.

From document D5, the space around the sleeve defines, during motion of the roll, a longitudinal confined space (76) provided between the sleeve (62) and the contacting internal faces (72,74) of the bushing (64).

This do not give any suggestion to the skilled person to modify a support bearing as

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.  
PCT/EP2004/052380

described in document D1 to the manner specified in claim 1. i.e. by forming an axial groove (40) on the inner surface of the second bush (34) facing the inner bush (31).

The present application is considered as involving an inventive step (Article 33(3) PCT).

**4. DEPENDENT CLAIMS**

Claims 2-4 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.